

CLAIMS

What is claimed is:

- 5
1. A fluid transport assembly comprising, in combination:
- 10 2. a pipeline for transporting a fluid such as oil, gas and water along a fluid flow path extending in the pipeline; and
- 15 a pressure control device incorporated in the pipeline for regulating the pressure of the fluid downstream the pressure control device to a predetermined pressure which is independent of, and less than, the pressure prevailing in the pipeline upstream of the pressure control device;
- 20 wherein the pressure control device comprises a housing with an inflow opening and an outflow opening wherein the fluid flow path of the pipeline extends in the housing between the inflow opening and the outflow opening, the inflow opening being in fluid connection with the pipeline upstream of the pressure control device the pressure control device further comprising a controllable seal for releasing and closing the fluid flow path in the housing and a pressure sensor element accommodated in the housing for movement between a first and a second position, the pressure sensor element in the first position controlling the controllable seal to release the fluid flow path in the housing and in the second position controlling the controllable seal to close off the fluid flow path in the housing, the pressure sensor element on the one hand being exposed to the pressure prevailing in the fluid flow path downstream of the controllable seal, and on the other being exposed to a predetermined force which, in use, determines the predetermined pressure, wherein, in use, the pressure sensor element moves in the direction of the first position when the pressure prevailing in the fluid flow path downstream of the seal drops below the predetermined pressure determined by the predetermined force and the pressure sensor element moves in the direction of the second position when the pressure prevailing in the fluid flow path downstream of the seal rises above the predetermined pressure determined by the predetermined force wherein the pressure control device comprises a gas-tight chamber, characterized in that, the pressure sensor element comprising a plunger accommodated in the chamber for movement in an axial direction of the chamber between the first and the second
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position, the space enclosed by the plunger and the chamber being filled with a gas for generating said predetermined force and the plunger being movable between the first and the second position in a direction parallel to the direction of the fluid flow path at the controllable seal and wherein the plunger is movable between the first and the second position in a direction from the inflow opening to the outflow opening, wherein the plunger moves in the direction of the first position if it moves in the direction of the inflow opening and the plunger moves in the direction of the second position if it moves in the direction of the outflow opening.

2. An assembly according to claim 1, wherein the plunger is movable between the first position and second position in a direction which is parallel to an axial direction of the pipeline at the pressure control device.

3. An assembly according to claim 1, wherein the controllable seal is movable in a direction parallel to the fluid flow path at the controllable seal.

4. An assembly according to claim 1, wherein the gas-tight chamber is manufactured from metal.

5. An assembly according to claim 1, wherein the pressure control device comprises a spring for generating at least a part of said predetermined force, the spring being accommodated in the space enclosed by the plunger and the chamber and the spring pressing the plunger in the direction of the first position.

6. An assembly according to claim 1, wherein the pressure control device comprises at least one ring-shaped sealing element and the controllable seal comprises a bar-shaped element, connected to the plunger, the sealing element extending around the bar-shaped element, the fluid flow path extending through the sealing element, the bar-shaped element and the sealing element in the first position releasing the fluid flow path, and the bar-shaped element and the sealing element in the second position closing the fluid flow path

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An assembly according to claim 6, wherein the bar-shaped element is movable between the first and second position in a direction which is parallel to the direction of the fluid flow path along the bar-shaped element.

5 8. An assembly according to claim 1, wherein the gas pressure in the space is greater than an atmospheric pressure.

9. An assembly according to claim 1, wherein the pressure control device is provided with mounting means for mounting the pressure control device to the pipeline.

10. The pressure control device according to claim 9, wherein the mounting means comprises a bayonet fastener.


11. An assembly according to claim 1, wherein the outflow opening is in fluid connection with the pipeline downstream of the pressure control device so that the pipeline also extends downstream of the pressure control device.

12. An assembly according to claim 1, wherein the pressure control device forms the end of the pipe line.

20 13. A pressure control device configured to receive a fluid from an upstream portion of a fluid flow path and expel fluid towards a downstream portion of said fluid flow path, the pressure control device further configured to regulate a pressure in the downstream portion of the fluid flow path to match a predetermined pressure which is independent of, and less than, a pressure prevailing in the upstream portion of the fluid flow path, the pressure control device comprising:

25 a housing having an inlet and an outlet, the inlet being in fluid communication with the upstream portion of the fluid flow path and the outlet being in fluid communication with the downstream portion of the fluid flow path;

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 a controllable seal positioned in the housing and in communication with the inlet, the controllable seal configured to release and close the fluid flow path through the housing; and

a pressure sensor element accommodated in the housing and configured to move between a first position in which the pressure sensor element causes the controllable seal to release the fluid flow path in the housing, and a second position in which the pressure sensor element causes the controllable seal to close off the fluid flow path in the housing, wherein

the pressure sensor element is exposed to a pressure prevailing in the fluid flow path downstream of the controllable seal, and is also exposed to a predetermined force which determines the predetermined pressure;

the pressure sensor element is configured to:

move in direction of the first position when the pressure prevailing in the fluid flow path downstream of the controllable seal drops below the predetermined pressure determined by the predetermined force; and

move in a direction of the second position when the pressure prevailing in the fluid flow path downstream of the seal rises above the predetermined pressure determined by the predetermined force;

the pressure sensor element comprises a plunger that is accommodated in a gas-tight chamber, a space enclosed between the plunger and the chamber being filled with a gas for generating said predetermined force;

the plunger is arranged to move in an axial direction of the chamber between the first and the second position;

the plunger is movable between the first and the second position in a direction parallel to the direction of the fluid flow path at the controllable seal; and

the plunger is movable between the first and the second position in a direction from the inflow opening to the outflow opening, with the plunger moving in the direction of the first position when it moves in the direction of the inflow opening and the plunger moving in the direction of the second position when it moves in the direction of the outflow opening.

14. The pressure control device according to claim 13, wherein the plunger is movable between the first and second position in a direction that is parallel to an axial direction of the pipeline at the pressure control device.

15. The pressure control device according to claim 13, wherein the controllable seal is movable in a direction parallel to the direction of the fluid flow path at the controllable seal.

16. The pressure control device according to claim 13, wherein the gas-tight chamber is manufactured from metal.

17. The pressure control device according to claim 13, wherein the pressure control device comprises a spring for generating a part of said predetermined force, the spring being accommodated in the space enclosed by the plunger and the chamber and the spring pressing the plunger in the direction of the first position.

18. The pressure control device according to claim 13, wherein the pressure control device comprises at least one ring-shaped sealing element and the controllable seal comprises a bar-shaped element, connected to the plunger, the sealing element extending around the bar-shaped element, the fluid flow path extending through the sealing element, the bar-shaped element and the sealing element in the first position releasing the fluid flow path, and the bar-shaped element and the sealing element in the second position closing the fluid flow path.

19. The pressure control device according to claim 13, wherein the bar-shaped element is movable between the first and second position in a direction which is parallel to the direction of the fluid flow path along the bar-shaped element.

20. The pressure control device according to claim 13, wherein the gas pressure in the space is greater than an atmospheric pressure.

21. The pressure control device according to claim 13, wherein the pressure control device is further provided with mounting means for mounting the pressure control device onto a pipeline.

22. The pressure control device according to claim 21, wherein the mounting means comprises a bayonet fastener.

23. A pressure control device arranged to be mounted to a pipeline which pipe line is arranged for transporting a fluid along a fluid flow path extending in the pipeline, wherein the pressure control device is arranged for regulating the pressure of the fluid downstream the pressure control device to a predetermined pressure which is independent of, and less than, the pressure prevailing in the pipeline upstream of the pressure control device, wherein the pressure control comprises a housing provided with an inflow opening and an outflow opening wherein, in use, the fluid flow path of the pipeline extends in the housing between the inflow opening and the outflow opening and the inflow opening being in fluid connection with the pipeline upstream of the pressure control device, the pressure control device further comprising a controllable seal for releasing and closing the fluid flow path in the housing and a pressure sensor element accommodated in the housing for movement between a first and a second position, the pressure sensor element in the first position controlling the controllable seal to release the fluid flow path in the housing and in the second position controlling the controllable seal to close off the fluid flow path in the housing, the pressure sensor element on the one hand being exposed to the pressure prevailing in the fluid flow path downstream of the controllable seal, and on the other being exposed to a predetermined force which, in use, determines the predetermined pressure, wherein, in use, the pressure sensor element moves in the direction of the first position when the pressure prevailing in the fluid flow path downstream of the seal drops below the predetermined pressure determined by the predetermined force and the pressure sensor element moves in the direction of the second position when the pressure prevailing in the fluid flow path downstream of the seal rises above the predetermined pressure determined by the predetermined force wherein the pressure control device comprises a gas-tight chamber, characterized in that, the pressure sensor element comprises a plunger accommodated in the chamber for movement in an axial

10 direction of the chamber between the first and the second position, the space enclosed by the
15 plunger and the chamber being filled with a gas for generating said predetermined force and the
20 plunger being movable between the first and the second position in a direction parallel to the
25 direction of the fluid flow path at the controllable seal, wherein the plunger is movable between
30 the first and the second position in a direction parallel to a direction from the inflow opening to
the outflow opening, wherein the plunger moves in the direction of the first position if it moves
in the direction of the inflow opening and the plunger moves in the direction of the second
position if it moves in the direction of the outflow opening.

10 24. A method for regulating a pressure of a fluid which is transported along a fluid
15 flow path extending through a pipeline, the method comprising the step of:

20 incorporating into the pipeline, a pressure control device for regulating the pressure of
the fluid downstream from the pressure control device to a predetermined pressure which is
independent of, and less than, the pressure prevailing in the pipeline upstream of the pressure
control device,

25 wherein the pressure control device comprises a housing provided with an inflow opening
and an outflow opening, wherein, in use, the fluid flow path of the pipeline extends in the
housing between the inflow opening and the outflow opening wherein, in use, the inflow opening
being in fluid connection with the pipeline upstream of the pressure control device;

30 the pressure control device further comprising a controllable seal for releasing and closing
the fluid flow path in the housing and a pressure sensor element accommodated in the housing
for movement between a first and a second position, the pressure sensor element in the first
position controlling the controllable seal to release the fluid flow path in the housing and in the
second position controlling the controllable seal to close off the fluid flow path in the housing,
the pressure sensor element on the one hand being exposed to the pressure prevailing in the fluid
flow path downstream of the controllable seal, and on the other being exposed to a predetermined
force which, in use, determines the predetermined pressure, wherein, in use, the pressure sensor
element moves in the direction of the first position when the pressure prevailing in the fluid flow
path downstream of the controllable seal drops below the predetermined pressure determined by
the predetermined force and the pressure sensor element moves in the direction of the second

position when the pressure prevailing in the fluid flow path downstream of the seal rises above the predetermined pressure determined by the predetermined force wherein the pressure control device comprises a gas-tight chamber; and wherein,

the pressure sensor element comprises a plunger accommodated in the chamber for movement in an axial direction of the chamber between the first and the second position, the space enclosed by the plunger and the chamber being filed with a gas for generating said predetermined force and the plunger being movable between the first and the second position in a direction which is parallel to the direction of the fluid flow path at the controllable seal, wherein, in use, the plunger is movable between the first and the second position in a direction which is parallel to a direction from the inflow opening to the outflow opening, wherein the plunger moves in the direction of the first position when it moves in the direction of the inflow opening and the plunger moves in the direction of the second position when it moves in the direction of the outflow opening.

25. The method according to claim 24, wherein the plunger moves between the first and second position in a direction which is parallel to an axial direction of the pipeline at the pressure control device.

26. The method according to claim 24, wherein the controllable seal is movable in a direction parallel to the fluid flow path at the controllable seal.

27. The method according to claim 24, wherein the gas-tight chamber is manufactured from metal.

28. The method according to claim 24, wherein the pressure control device comprises a spring for generating a part of said predetermined force, the spring being accommodated in the space enclosed by the plunger and the chamber and the spring pressing the plunger in the direction of the first position.

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29. The method according to claim 24, wherein the pressure control device comprises at least one ring-shaped sealing element and the controllable seal comprises a bar-shaped element, connected to the plunger, the sealing element extending around the bar-shaped element, the fluid flow path extending through the sealing element, the bar-shaped element and the sealing element in the first position releasing the fluid flow path, and the bar-shaped element and the sealing element in the second position closing the fluid flow path.

30. The method according to claim 29, wherein the bar-shaped element is movable between the first and second position in a direction which is parallel to the direction of the fluid flow path along the bar-shaped element.

31. The method according to claim 24, wherein the gas pressure in the space is greater than an atmospheric pressure.

32. The method according to claim 24, wherein the pressure control device forms the end of the pipe line.

33. The method according to claim 24, wherein the pressure control device is used such that the outflow opening is in fluid connection with the pipeline downstream of the pressure control device so that, in use, the pipeline also extends downstream the pressure control device.